Claims:

1. An antenna element comprising:

a ground plane:

a helix disposed above the ground plane, the helix being connectable to a communications apparatus at a helix end located near the ground plane; and

a spiral substantially centred on the axis of the helix the spiral having an outer end thereof connected to the other helix end, said spiral thereby terminating the antenna.

2. An antenna element according to claim 1, wherein the axis of the helix is substantially perpendicular to the ground plane.

3. An antenna element according to claim 1, wherein the spiral lies in a flat plane that is substantially perpendicular to the axis of the helix.

4. An antenna element according to claim 1, further including a tapered transmission line connected between the communications apparatus and the end of the helix located near the ground plane.

5. An antenna element according to claim 1, wherein:

the helix has (a) between 1.5 and 3.5 turns, (b) a pitch angle of between 3 and 7 degrees, and (c) a circumference of between 0.9 and 1.15 wavelengths; and

the spiral has between 1 and 4 turns.

6. An antenna element according to claim 1, wherein:

the helix has (a) between 3.5 and 40 turns, (b) a pitch angle of between 10 and 14 degrees, and (c) a circumference of between 0.9 and 1.15 wavelengths; and

the spiral has between 1 and 4 turns.

7. An antenna comprising:

a switched element feed network having an equipment feed-line for connection to communication apparatus and a plurality of element feed-lines for connection to a like plurality of antenna elements, said switched element feed network being adapted to connect a selected one of the antenna elements to the communication apparatus; and

said plurality of helix antenna elements according to claim 1, said helix antenna elements being disposed above said ground plane, each said helix antenna element being individually connectable at a respective helix end located near the ground plane to a respective element feed-line of the switched element feed network to thereby connect to the communications apparatus.

8. An antenna comprising:

a phased array feed network having an equipment feed-line for connection to communication apparatus and a plurality of element feed-lines for connection to a like plurality of antenna elements, said phased array feed network being adapted to collectively connect said plurality of antenna elements to the communication apparatus; and

said plurality of helix antenna elements according to claim 1, said helix antenna elements being disposed above said ground plane, each said helix antenna element being individually connectable at a respective helix end located near the ground plane to a respective element feed-line of the phased array feed network to thereby connect to the communications apparatus.

9. An antenna according to claim 8, wherein the plurality of helix antenna elements are arranged in a domino pattern.

10. An antenna comprising:

a phased array feed network having an equipment feed-line for connection to communication apparatus and a plurality of element feed-lines for connection to a like plurality of antenna elements, said phased array feed network being adapted to collectively connect said plurality of antenna elements to the communication apparatus; and

said plurality of helix antenna elements arranged in a domino pattern, each said helix antenna element comprising a ground plane, and a helix disposed above the ground plane, the helix being connectable to a communications apparatus at a helix end located near the ground plane, each said helix antenna element being individually connectable at a respective helix end located near the ground plane to a respective element feed-line of the phased array feed network to thereby connect to the communications apparatus.

11. An antenna according to claim 9 or claim 10, wherein:

the radial inter-element spacing between the centre antenna element and antenna elements at said corners of the domino pattern is between 0.5λ and 2.5λ at the frequency of operation of the antenna.

12. An antenna having two antennas according to claim 9 or claim 10, wherein:

a centre helix antenna element of a first of said two antennas is co-located with a centre helix antenna element of a second of said two antennas; and

the first of said two antennas is laterally rotated with respect to the second of said two antennas, said lateral rotation being about a common axis of the co-located centre helix antenna elements to thereby change inter-element spacing between antenna elements of said two antennas.

13. An antenna comprising:

a ground plane:

a plurality of helix elements disposed above the ground plane, each said helix being connectable, via a respective feed line of an associated phased array feed network to a communications apparatus, at a helix end located near the ground plane; and

a like plurality of spirals, each substantially centred on the axis of the corresponding one of the plurality of helix elements, said each spiral having an outer end thereof connected to the other helix end of the corresponding one of the plurality of helix elements, said spiral thereby terminating the corresponding helix element.

14. An antenna comprising:

a ground plane:

a plurality of helix elements disposed above the ground plane, each said helix being connectable, via a respective feed line of an associated switched element feed network to a communications apparatus, at a helix end located near the ground plane; and

a like plurality of spirals, each substantially centred on the axis of the corresponding one of the plurality of helix elements, said each spiral having an outer end thereof connected to the other helix end of the corresponding one of the plurality of helix elements, said spiral thereby terminating the corresponding helix element.

15. An antenna comprising:

a phased array feed network having an equipment feed-line for connection to communication apparatus and a plurality of element feed-lines for connection to a like plurality of antenna elements, said phased array feed network being adapted to collectively connect said plurality of antenna elements to the communication apparatus; and

said plurality of helix antenna elements according to claim 1, said helix antenna elements being disposed above said ground plane and arranged in a rectangular grid pattern having a first spacing between rows of said rectangular grid pattern and a second spacing between columns of said rectangular grid pattern, each said helix antenna element being individually connectable at a respective helix end located near the ground plane to a respective element feed-line of the phased array feed network to thereby connect to the communications apparatus.

16. An antenna comprising:

a phased array feed network having an equipment feed-line for connection to communication apparatus and a plurality of element feed-lines for connection to a like plurality of antenna elements, said phased array feed network being adapted to collectively connect said plurality of antenna elements to the communication apparatus; and

said plurality of helix antenna elements being disposed above said ground plane and arranged in a rectangular grid pattern having a first spacing between rows of said rectangular grid pattern and a second spacing between columns of said rectangular grid pattern, each said helix antenna element being individually connectable at a respective helix end located near the ground plane to a respective element feed-line of the phased array feed network to thereby connect to the communications apparatus.

17. A method of impedance matching an antenna element wherein the antenna element comprises a ground plane, a helix disposed above the ground plane, the helix being connectable to a communications apparatus at a helix end located near the ground plane, and a spiral substantially centred on the axis of the helix the spiral having an outer end thereof connected to the other helix end, said spiral thereby terminating the antenna, said method comprising the steps of:

adjusting a distance, from the ground plane, of the helix end located near the ground plane to thereby adjust the impedance of a tapered transmission line formed between the ground plane and a first quarter turn of the helix.